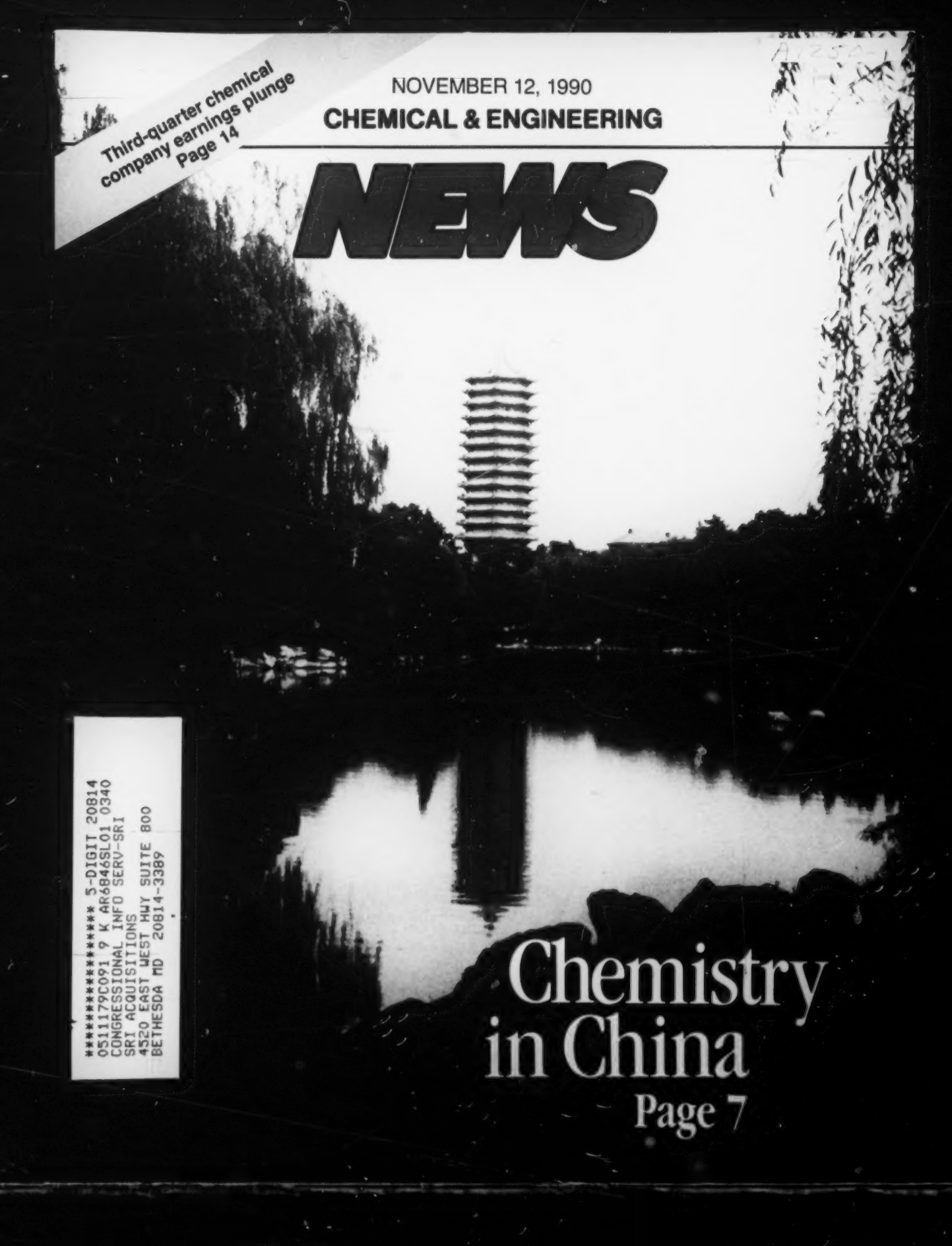
NOVEMBER 12, 1990
CHEMICAL & ENGINEERING

NEWS

Third-quarter chemical company earnings plunge
Page 14



Chemistry in China

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NEWS
NOVEMBER 12, 1990

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News of the Week

■ **Elections returned most Congressional incumbents who hold key positions in science and technology, and brought stinging defeats to several state environmental referenda.** **Page 4**

■ **FAA introduces improved explosive-detection system for baggage screening at airports that combines thermal neutron analysis and x-ray screening.** **Page 5**

■ **Fast-food giant McDonald's will stop using polystyrene foam packaging, including the familiar clamshell-like burger container, at all its restaurants.** **Page 5**

■ **Scientists insert foreign DNA into chloroplasts of tobacco plants—the first such achievement in multicelled plants.** **Page 6**

■ **Japanese white paper on science and technology calls for efforts to improve the quality of life for Japan's, and the world's, citizens.** **Page 6**

Cover: Water tower in the form of a pagoda near Nameless Lake at the University of Peking. Photo by C&EN's Joseph Haggin

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Business

Chemical company earnings continued their slide into the third quarter, marking the fifth quarter in a row that results fell; chemical marketing research conference in Budapest looks at prospects in Eastern Europe; France promotes huge chemical complex near Marseilles. **Page 14**

Government

1990 Clean Air Bill revision allows EPA to halt air pollutants at source, a move likely to be costly to chemical industry. **Page 23**

Science Policy

Bush Administration will face some tough decisions as it develops a full-fledged national technology policy. **Page 25**

Education

Careers in materials science were focus of recent conference for undergraduates held at University of Wisconsin, Madison. **Page 27**

Science/Technology

Two bacterial enzymes that catalyze mechanistically distinct reactions are structurally homologous, suggesting possible evolutionary link; Rochester, N.Y., scientists build scanning tunneling microscopes for loan to 15 private colleges and universities. **Page 30**

Awards

ACS award winners: Poulter, Reiss, Roth, Small, Solomon, Stork, Vandenberg, Weinberg, Willson, and Zare. **Page 37**

News Focus

Chinese scientific and technical progress, crucial to country's becoming a competitive industrialized nation, is showing need for professionals to have closer association with counterparts outside China. Page 7

Chemical & Engineering News
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LETTERS

Energy-efficient gas turbines

I read with great interest the article on energy research by Janice Long (C&EN, Sept. 10, page 16). When the topic is fuel-efficient automobiles, various proposals are discussed, all involving improvements in the internal combustion engine. Others have proposed the Stirling external combustion engine, which can use fuels other than gasoline.

Never does anyone mention gas turbines, which operate at higher temperatures leading to much higher Carnot efficiency. They can operate on many fuels, including hydrogen. The drawback is that maximum efficiency requires top speed, precluding speed control by variable fuel feed. The solution is turboelectric. The turbine drives a generator whose output is fed to one or more electric motors driving the wheels. There is a variety of possible ways to implement such systems. The U.S. Navy built several torpedo boats in World War II based on this system.

Ephraim Banks
Professor Emeritus
Polytechnic University
New York City

Celluloid's commercial success

Stu Borman's well-written article, "Conference Offers Insights on Challenges Facing Science Historians" (C&EN, Aug. 6, page 23) offers a fascinating summary of the many opportunities available to scientists in general, and chemists in particular, especially in forming alliances with teachers and historians. The conference appears to have covered a wide range of historical and scientific issues.

One comment in the article prompts me to point out an important fact that was omitted either from the reporting or from the conference. On page 27, Borman notes that celluloid was invented in 1870 by John Wesley Hyatt. However, this material owes its real commercial success to the years of developmental effort spent by Swiss-born chemists Camille and Henry Dreyfus. Between 1908 and 1911, the Dreyfus brothers carried out more than 20,000 experiments to develop a production process, exploring topics such as the nature and proportion of catalyst, quantities of acetylating agents and diluents, times and temperatures of acetylation, and the nature of the raw cellulose. The first to realize the effect of cellulose acetate's acetyl content on the material's properties, they also showed that viscosity, high tensile strength, and elasticity are complementary, and found how to avoid cellulose degradation, long before the polymeric nature of cellulose was discovered many years later. The first to discover methods of converting cellulose acetate into workable and dyable fibers, they founded Celanese Corp. and paved the way for development of the modern synthetic fibers industry. For their efforts, Henry Dreyfus received the Perkin Medal in 1938, which, characteristically, he accepted in his brother's name as well.

Robert L. Lichter
Executive Director
Camille & Henry Dreyfus Foundation
New York City

Xenon as an anesthetic

In one of your Science/Technology Concentrates (C&EN, July 2, page 20) it was announced that xenon has been found to be a good anesthetic. Xenon is that, and it is good to see that it has been put through some clinical trials. However, this is not a new finding; it has been known for decades. In fact, Linus Pauling, partly on the basis of his crystallographic work on xenon hydrates, published "A Molecular Theory of General Anesthesia" [*Science*, **134**, 15 (1961)].

Karl Seff
Professor of Chemistry
University of Hawaii, Manoa

Solving national problems

I read with concern "Changes in Immigration Law Eyed To Avert Shortage of U.S. Scientists" (C&EN, Aug. 20, page 19). Here is another sad example of how we solve our national problems.

First, we lack the will to develop any national energy policy that reduces our reliance on oil. Then, because of our gigantic (and growing) appetite for this scarce U.S. resource, we require the import of foreign oil for 55% of our consumption. Then we send American military forces to Saudi Arabia so we can continue the import folly.

Second, we lack the will to be fiscally responsible. Then, to float the gigantic (and growing) national debt, we must depend on foreign dollars. Then we become the world's largest debtor nation, and captive to an endless list of foreign country trade and financial policies, many of which are basically inimical to the U.S. national interest.

And now third, we lack the will to properly construct and operate our edu-

Chemical Earnings Nosedive Continues in Third Quarter

William J. Storck,
C&EN Northeast News Bureau

Earnings in the chemical industry averaged a double-digit decline in the third quarter compared with a year ago. Earnings for oil companies, however, were up slightly at 2% and were essentially flat for diversified manufacturers. And profits at drug companies were up strongly at 18% over the year-earlier quarter.

Total earnings at the 30 chemical companies regularly surveyed by C&EN declined 25%, continuing the trend that started in the middle of last year. This was the fifth quarter in a row that results fell and it is the fourth straight quarter that the earnings contraction has been greater than 20%.

However, the third quarter was full of inconsistencies. While combined earnings at the 30 companies dropped, sales for the group averaged a rise of 10%, the best year-to-year sales growth performance since the first quarter of 1989.

And, in spite of the much talked about chemical slowdown, only 12 of the 30 companies registered earnings declines. This is the same number that showed declines in the second quarter. Thus, it seems that even at this late date, the slowdown is not being widely felt in the chemical industry, and is not spreading very fast throughout the companies.

What is being felt, however, is the crisis in the Middle East. Many of the companies that had large earnings declines in the third quarter are those that are heavily dependent on feedstocks, the prices of which are closely related to oil's. Among these firms with well above average declines are the three largest on the list, Dow Chemical, Union Carbide,

Chemical industry leaders for third quarter . . .

Sales				Earnings[a]			Profitability		
Rank 1990		$ Millions	Rank 1989		$ Millions	Rank 1989		Earnings as % of sales	Rank 1989
1	Dow Chemical	$4,919.0	1	Dow Chemical	$284.0	1	International Flavors	16.2%	2
2	Union Carbide	2,203.0	2	Union Carbide	91.0	2	Great Lakes Chemical	13.2	5
3	Monsanto	2,140.0	3	Monsanto	74.0	3	Loctite	12.7	6
4	W. R. Grace	1,671.6	4	Air Products	63.1	6	Betz Laboratories	11.5	8
5	American Cyanamid	1,056.3	5	Ethyl	56.2	5	Nalco Chemical	10.9	7
6	Air Products	816.3	7	Arco Chemical	56.0	4	Lubrizol	10.5	12
7	Hercules	812.0	6	American Cyanamid	52.0	7	Georgia Gulf	10.0	1
8	Rohm & Haas	683.6	9	B. F. Goodrich	50.6	9	Ethyl	9.0	10
9	Arco Chemical	681.0	8	Rohm & Haas	45.9	12	Arco Chemical	8.2	3
10	Olin	656.0	12	W. R. Grace	45.2	10	B. F. Goodrich	8.0	16

. . . and for the first nine months of 1990

Sales				Earnings[a]			Profitability		
Rank 1990		$ Millions	Rank 1989		$ Millions	Rank 1989		Earnings as % of sales	Rank 1989
1	Dow Chemical	$14,626.0	1	Dow Chemical	$1110.0	1	International Flavors	17.2%	2
2	Monsanto	6,793.0	2	Monsanto	515.0	2	Great Lakes Chemical	13.4	3
3	Union Carbide	6,511.0	3	Union Carbide	301.0	3	Loctite	12.4	7
4	W. R. Grace	4,807.5	4	American Cyanamid	257.3	5	Arco Chemical	11.6	4
5	American Cyanamid	3,437.1	5	Arco Chemical	240.0	4	Betz Laboratories	11.1	9
6	Hercules	2,379.0	6	Air Products	174.2	7	Georgia Gulf	10.8	1
7	Air Products	±2,242.2	9	Rohm & Haas	170.0	8	Nalco Chemical	10.8	8
8	Rohm & Haas	2,146.5	8	Ethyl	165.8	6	Lubrizol	9.4	13
9	Arco Chemical	2,071.0	7	W. R. Grace	129.1	12	Ethyl	9.0	10
10	Olin	1,952.0	10	International Flavors	127.8	11	Vista Chemical	8.1	6

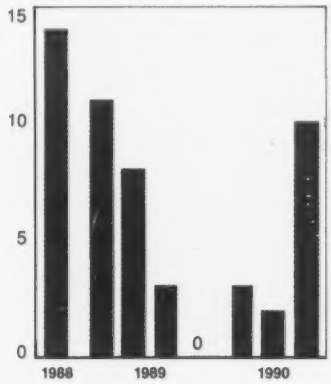
Note: Based on 30 chemical companies listed on page 16. a After taxes.

Chemical industry 1990 third-quarter results

- Sales were up 10%
- Earnings fell 25%
- Profit margins at 5.4%
- Production rose 2.1%
- Prices edged up 0.9%

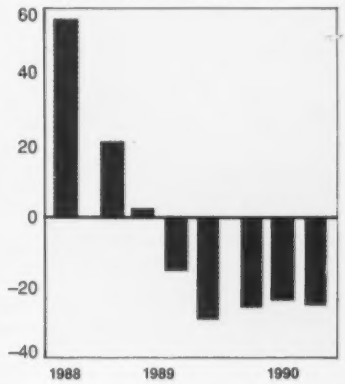
Sales

% change from year-earlier quarter



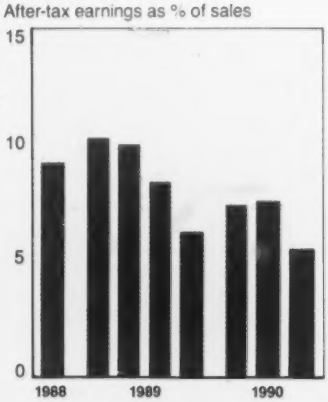
Earnings

% change from year-earlier quarter



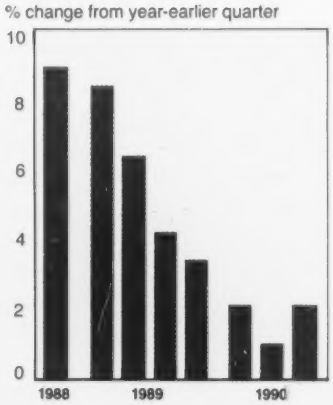
Profit margins

After-tax earnings as % of sales



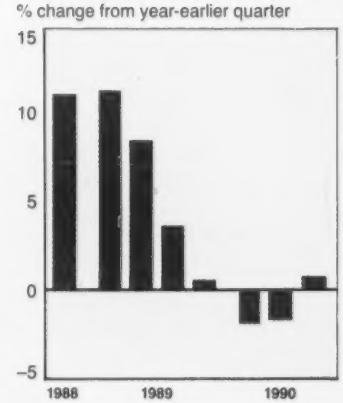
Production

% change from year-earlier quarter



Prices

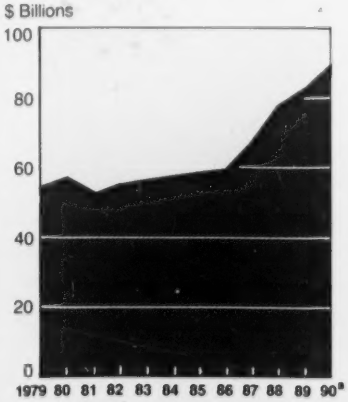
% change from year-earlier quarter



Sales in 1990 will rise about 7% while earnings will be down 26%, pushing down profit margins to about 6%

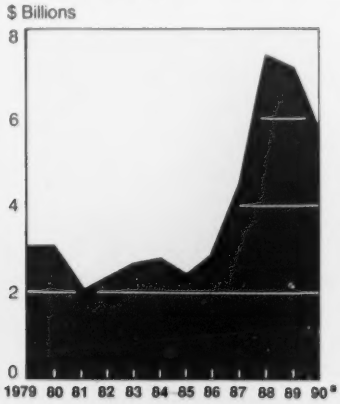
Annual sales

$ Billions



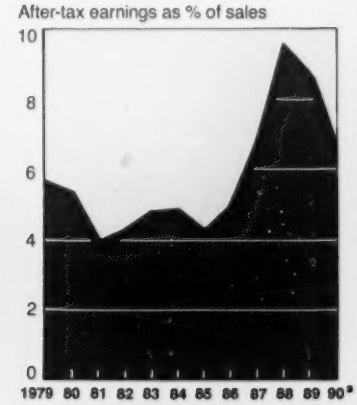
Annual earnings

$ Billions



Annual profit margins

After-tax earnings as % of sales



Note: All sales, earnings, and profit margin data are based on combined results of 30 companies listed on page 16. a C&EN estimates.

Many chemical companies register big profitability declines in third quarter

	THIRD-QUARTER 1990						NINE-MONTHS 1990			
	Sales	Earnings[a]	Change from 1989		Profit margin[b]		Sales	Earnings[a]	Change from 1989	
	($ millions)		Sales	Earnings	1990	1989	($ millions)		Sales	Earnings
Air Products	$ 816.3	$ 63.1	22%	24%	7.7%	7.6%	$ 2,242.2	$ 174.2	12%	12%
American Cyanamid	1,056.3	52.0	9	2	4.9	5.3	3,437.1	257.3	7	14
Arco Chemical	681.0	56.0	8	–40	8.2	14.9	2,071.0	240.0	1	–27
Betz Laboratories	153.4	17.6	15	17	11.5	11.3	444.4	49.4	14	17
Cabot	399.9	10.1	–10	def	2.5	def	1,267.0	41.4	–13	31
Chemed	155.1	5.1	1	–36	3.3	5.1	450.4	14.6	1	–28
Crompton & Knowles	96.3	7.0	10	20	7.3	6.6	289.1	22.7	7	23
Dow Chemical	4,919.0	284.0	16	–52	5.8	13.9	14,626.0	1110.0	10	–46
Ethyl	624.2	56.2	2	3	9.0	8.9	1,840.0	165.8	3	6
First Mississippi	134.9	4.3	32	372	3.2	0.9	398.4	6.4	11	–6
H. B. Fuller	203.1	6.4	7	68	3.2	2.0	589.2	14.0	5	32
Georgia Gulf	232.7	23.2	–7	–50	10.0	18.3	703.1	76.3	–18	–49
B. F. Goodrich	634.5	50.6	6	29	8.0	6.5	1,856.8	101.7	1	–29
W. R. Grace	1,671.6	45.2	12	23	2.7	2.5	4,807.5	129.1	9	16
Great Lakes Chemical	268.1	35.4	17	12	13.2	13.8	776.9	104.3	37	14
Hercules	812.0	29.5	3	–3	3.6	3.9	2,379.0	99.8	3	–8
Imcera Group	375.7	18.0	19	140	4.8	2.4	1,132.2	64.5	35	–13
International Flavors	248.1	40.3	14	18	16.2	15.8	743.5	127.8	9	12
Loctite	138.9	17.6	21	22	12.7	12.6	412.0	51.0	17	14
Lubrizol	364.7	38.4	34	79	10.5	7.8	1,075.8	100.6	14	29
Monsanto	2,140.0	74.0	4	–41	3.5	6.1	6,793.0	515.0	2	–13
Morton International	451.9	33.7	27	30	7.5	7.3	1,328.1	103.3	22	23
Nalco Chemical	300.3	32.7	11	1	10.9	12.0	886.8	95.5	13	9
Olin	656.0	15.0	13	–38	2.3	4.1	1,952.0	76.0	2	–18
Petrolite	73.5	2.8	2	–56	3.7	8.7	218.2	10.0	1	16
Quantum Chemical	621.9	–1.4	12	def	def	3.6	1,890.7	11.5	–8	–92
Rohm & Haas	683.6	45.9	10	41	6.7	5.2	2,46.5	170.0	5	10
Union Carbide	2,203.0	91.0	3	–35	4.1	6.5	6,511.0	301.0	–2	–43
Vista Chemical	182.1	7.8	–3	–63	4.3	11.3	548.8	44.5	–7	–50
Witco	419.3	19.6	6	–4	4.7	5.2	1,217.8	57.4	1	–10
TOTAL	$21,717.6	$1181.1	10%	–25%	5.4%	8.0%	$65,034.5	$4335.2	5%	–25%

a After-tax earnings from continuing operations, excluding significant nonrecurring and extraordinary items. b After-tax earnings as a percentage of sales. def=deficit.

and Monsanto, as well as a number of companies with close ties to petrochemicals, such as Quantum Chemical, Arco Chemical, Vista Chemical, and Georgia Gulf.

Again, adding to the complexities, a few of these companies had very respectable increases in sales. This indicates that, although the firms may be getting price hikes, these increases are not keeping up with the rise in the price of oil and other basic feedstocks, creating a considerable profit squeeze.

The increased sales may also mirror the weakness of the dollar against foreign currencies. Thus, though companies can sell increased quantities of product overseas, the dollar value of each pound of product goes down as the foreign currency in relation to the dollar strengthens.

Although third-quarter results followed most of the chemical economic fundamentals, there were some anomalies here as well. Normally in any given period the sum of the price increase and the production increase will approximate the increase in sales. According to government data, prices rose about 1% in the third quarter over the same period last year. And production of chemicals and allied products was up about 2% from the year-earlier level. The 3% sum, however, comes nowhere near the 10% sales increase recorded by the 30 companies. Since the increased sales volume had to come from somewhere other than production, it could only come from inventories. And this indeed seems to be the case.

Though inventory data are available from the government only through August, the data for that month show that producer stocks of

NINE-MONTHS 1990		12-MONTH RUNNING DATA			
Profit margin[b]		Change from 1989		Profit margin[b]	
1990	1989	Sales	Earnings	1990	1989
7.8%	7.8%	10%	1%	7.7%	8.4%
7.5	7.0	–1	–11	6.2	6.8
11.6	16.0	–4	—23	13.4	16.6
11.1	10.9	14	15	11.0	10.9
3.3	2.2	–13	6	3.6	2.9
3.2	4.6	1	–16	3.4	4.1
7.9	6.8	5	11	6.7	6.4
7.6	15.4	7	–43	8.1	15.3
9.0	8.8	3	0	9.2	9.4
1.6	1.9	17	–40	1.5	2.9
2.4	1.9	5	26	2.5	2.1
10.8	17.5	–17	–35	14.0	17.9
5.5	7.8	–2	–34	5.3	7.9
2.7	2.5	8	21	3.3	2.9
13.4	16.2	42	14	13.5	16.8
4.2	4.7	5	–50	2.1	4.4
5.7	8.8	37	–1	5.0	7.0
17.2	16.8	8	11	16.3	15.9
12.4	12.7	15	13	12.1	12.3
9.4	8.3	12	17	8.6	8.2
7.6	8.8	3	–10	6.5	7.4
7.8	7.7	21	19	7.9	8.0
10.8	11.1	11	11	10.9	11.0
3.9	4.9	1	–6	4.2	4.5
4.6	4.0	1	26	4.6	3.7
0.6	6.7	–12	–88	1.2	9.0
7.9	7.6	5	–3	6.9	7.5
4.6	7.9	–2	–46	4.7	8.5
8.1	15.1	–8	–52	8.1	15.7
4.7	5.3	0	–18	4.2	5.1
6.7%	**9.4%**	**4%**	**–27%**	**6.6%**	**9.4%**

chemicals and allied products were down just 1.2% from the previous August. However, inventories of industrial chemicals, the classification used for the commodities, dropped 9.5% from the same month in 1989. The result was that the inventories-to-shipments ratios for both chemicals and allied products at 1.26 and industrial chemicals at 1.20 were at their lowest levels in years (C&EN, Oct. 22, page 7).

Whatever the factors involved in the third-quarter results, the upshot is that earnings at the 30 chemical companies fell an average 25% to $1.18 billion on a sales increase of 10% to $21.7 billion. As a result of the rapidly declining earnings and increasing sales figures, profitability suffered greatly. Weighted profit margins for the 30-company group fell to 5.4% in the third quarter from 8.0% in the year-earlier quarter, and were down from 7.2% in the second quarter, which is historically stronger than the third.

For the first nine months, combined earnings at the chemical companies were also down 25% to almost $4.34 billion on sales up 5% to $65 billion. As a result, profit margins for the group fell to an average 6.7% for the nine months as opposed to 9.4% for the first three quarters of 1989.

In contrast, earnings at 12 oil companies that are large producers of chemicals rose 2% on average in the third quarter to $3.42 billion on a 22% sales increase to $98.3 billion. Profitability for this group fell to an average 3.5% from 4.2% in the comparable period last year. For 11 diversified companies producing chemicals as well as other products, combined earnings were flat at $1.65 billion on an 11% sales rise to $28.5 billion. This pushed profit margins for the group down to an aggregate 5.8% from 6.4% in the third quarter of 1989.

But once again the recession-resistant pharmaceutical companies were the star performers. At a group of nine drug companies surveyed by C&EN, earnings rose 18% to a total $2.25 billion and sales increased 11% to $14.2 billion. This boosted profitability to an average 15.9% for the group from 15.0% in the same period last year.

The Persian Gulf crisis has had a marked effect on third-quarter results at many of the chemical companies, even though it began just a little less than halfway through the quarter. As previously noted in C&EN, for instance, industrial gas companies such as Air Products and Union Carbide have been forced to place surcharges on prices to cover the increased cost of transportation.

But the biggest damper on earnings has been rising feedstock costs. Dow Chemical, whose earnings plummeted 52% from last year's third quarter, cites soaring oil costs and a faltering economy. The company says that overall prices increased more than 5% from the second quarter, but manufacturing costs also increased as a result of higher feedstock and energy costs. Enrique C. Falla, Dow's financial vice president, says, "By the end of the third quarter, pricing initiatives were in place to offset much of the increases in feedstock costs to date." He also noted that the company's price index likely will increase sharply in the fourth quarter as announced price increases are implemented globally.

Quantum Chemical, which recorded a more than $1 million loss for the quarter, says that profit margins in the propane marketing business declined compared with last year's third quarter primarily because higher propane costs as a result of the Middle East crisis were not fully offset by increased selling prices. Similarly, the company notes, polyethylene margins have narrowed since the second quarter of 1990 because Quantum was unable to pass along increases in the cost of feedstocks.

To see the chilling effect of rising oil prices and energy costs on petrochemicals, one only need look at the performance of the oil companies, which largely produce chemicals based on oil and natural gas. At Exxon, the third largest U.S. chemical producer, earnings from chemical operations fell 57% to $65 million in the quarter. And the company had a $19 million loss on its foreign chemical operations.

Occidental Petroleum's chemical earnings in the third quarter dropped 40% from the year-earlier level to $152 million. The company

Oil, diversified, and pharmaceutical companies show widely differing results in third quarter

	THIRD-QUARTER 1990						NINE-MONTHS 1990					
	Sales	Earnings[a]	Change from 1989		Profit margin[b]		Sales	Earnings[a]	Change from 1989		Profit margin[b]	
	($ millions)		Sales	Earnings	1990	1989	($ millions)		Sales	Earnings	1990	1989
OIL AND GAS COMPANIES												
American Petrofina	$ 1,054.6	$ 26.5	48%	76%	2.5%	2.1%	$ 2,783.5	$ 106.5	22%	1%	3.8%	4.6%
Amoco	7,927.0	530.0	20	58	6.7	5.1	22,434.0	1,375.0	13	7	6.1	6.5
Chevron	10,600.0	323.0	33	-21	3.0	5.1	28,800.0	1,380.0	21	21	4.8	4.8
Exxon	29,107.0	1,075.0	23	0	3.7	4.5	81,818.0	3,455.0	18	3	4.2	4.6
Kerr-McGee	986.2	43.1	32	128	4.4	2.5	2,643.8	100.3	16	14	3.8	3.8
Mobil	16,308.0	379.0	21	-29	2.3	4.0	45,160.0	1,277.0	9	-6	2.8	3.3
Occidental Petroleum	5,350.0	111.0	11	68	2.1	1.4	15,631.0	290.0	4	28	1.9	1.5
Phillips Petroleum	3,430.0	178.0	12	105	5.2	2.8	9,405.0	542.0	0	14	5.8	5.1
Shell Oil	6,205.0	227.0	15	-33	3.7	6.3	17,133.0	590.0	4	-48	3.4	6.9
Sun Co.	3,350.0	25.0	23	-71	0.7	3.1	9,350.0	211.0	13	-22	2.3	3.3
Texaco	10,954.0	381.0	31	25	3.5	3.7	28,831.0	1,062.0	9	20	3.7	3.4
Unocal	3,070.0	121.0	9	51	3.9	2.9	8,429.0	363.0	-1	25	4.3	3.4
TOTAL	$98,341.8	$3,419.6	22%	2%	3.5%	4.2%	$272,418.3	$10,751.8	12%	1%	3.9%	4.4%
DIVERSIFIED MANUFACTURERS												
Allied-Signal	$ 2,961.0	$ 105.0	5%	-13%	3.5%	4.3%	$ 9,200.0	$ 355.0	4%	-9%	3.9%	4.4%
Du Pont	9,933.0	533.0	16	-3	5.4	6.4	28,983.0	1,842.0	9	-8	6.4	7.5
—Eastman Kodak	4,774.0	358.0	5	19	7.5	6.6	13,757.0	941.0	2	15	6.8	6.0
Engelhard	874.6	16.0	49	-9	1.8	3.0	2,284.4	48.9	29	4	2.1	2.6
FMC	941.0	35.4	12	2	3.8	4.2	2,741.7	128.2	6	3	4.7	4.8
Ferro Corp.	281.4	8.0	5	-33	2.8	4.5	843.2	21.2	4	-43	2.5	4.6
3M	3,343.0	336.0	12	9	10.1	10.3	9,741.0	1,013.0	8	6	10.4	10.5
NL Industries[c]	221.0	17.5	-11	-73	7.9	26.4	679.3	83.0	-11	-45	12.2	19.7
PPG Industries	1,470.0	107.1	8	0	7.3	7.8	4,520.0	373.4	5	3	8.3	8.4
Tenneco	3,392.0	91.0	6	1	2.7	2.8	10,630.0	431.0	4	14	4.1	3.7
Vulcan Materials	306.6	42.1	0	-17	13.7	16.4	834.3	100.5	2	-8	12.0	13.4
TOTAL	$28,497.6	$1,649.1	11%	0%	5.8%	6.4%	$ 84,213.9	$ 5,337.1	6%	-1%	6.3%	6.8%
PHARMACEUTICAL COMPANIES												
Abbott Laboratories	$ 1,506.8	$ 220.8	15%	13%	14.7%	15.0%	$ 4,448.6	$ 686.0	13%	13%	15.4%	15.5%
American Home Products	1,743.5	317.6	-2	14	18.2	15.7	5,162.0	902.4	1	13	17.5	15.6
Baxter International[d]	2,020.0	135.0	12	32	6.7	5.6	5,926.0	-138.0	9	def	def	5.6
Bristol-Myers Squibb	2,622.2	495.9	13	21	18.9	17.7	7,563.8	1,322.3	11	20	17.5	16.1
Merck	1,914.3	465.0	17	19	24.3	23.9	5,572.1	1,339.0	16	19	24.0	23.5
Pfizer	1,643.0	243.3	14	12	14.8	15.1	4,620.7	646.4	11	9	14.0	14.2
Shering-Plough	793.0	140.0	7	23	17.6	15.3	2,522.9	434.5	6	21	17.2	15.1
Upjohn	747.1	112.2	13	11	15.0	15.3	2,222.2	342.2	9	12	15.4	14.9
Warner Lambert	1,186.7	124.8	7	17	10.5	9.7	3,441.5	379.5	9	18	11.0	10.2
TOTAL	$14,177.3	$2,254.6	11%	18%	15.9%	15.0%	$ 41,479.7	$ 5,914.3	10%	7%	14.3%	14.8%

a Earnings from operations, excluding significant nonrecurring and extraordinary items. b Earnings from operations as a percentage of sales. c 1989 earnings include gain on disposition of businesses. d 1990 nine-months earnings include major nonrecurring charge. def=deficit.

notes that the reduced earnings resulted from lower selling prices in all major product areas, as well as higher feedstock costs in petrochemicals. And Mobil's chemical earnings fell 30% to $85 million, primarily owing to lower petrochemical margins, although the company registered higher petrochemical sales volumes.

Forecasting the remainder of the year is difficult, considering the problems that arose in the third quarter. Most chemical companies believe that they have programs in place that will at least partially combat the effects of the Middle East crisis. However, in spite of that, it looks like the fourth quarter will be another period of declining earnings for the chemical industry. □

Problems cloud East European industry

Two years ago, the European Association for Business Research, Planning & Development in the Chemical Industry (formerly the European Chemical Marketing Research Association), set Budapest as the site of its annual conference, little dreaming of the tumultuous changes that would sweep Eastern Europe. However, late last month at the group's conference, high on the agenda was prospects for the chemical industry in Eastern Europe, and western industry's role in those prospects.

Budapest is probably the best place to begin an exploration of the Eastern European industry. The city, awash with architectural riches, sometimes exuberantly decorated, has an impoverished, poor-cousin aura about it. Nonetheless, its people are well-educated and highly cosmopolitan, well conscious of being "European"—and eager to accomplish full integration with their western neighbors as quickly as possible, despite such problems as the lack of hard currency and diminishing supplies of Soviet energy and feedstock materials.

The chemical industry will be a particularly important part of the transition to internationalism, said Gábor Naray-Szabó, president of the Hungarian Chemical Society, in his keynote speech. Naray-Szabó is also managing director of Bionavion, the Hungarian subsidiary of U.S.-based Navix, a biochemicals firm, and so he spoke as both a research chemist and as an industrialist.

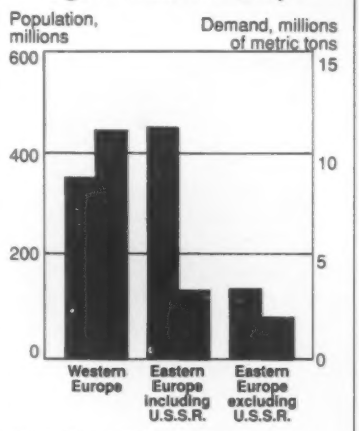
According to Naray-Szabó, in 1987 the chemical industry accounted for 8% of Hungary's gross national product and 18% of its gross industrial product. Free-currency exports of chemicals almost doubled between 1980 and 1989; last year, chemicals made up 24% of the country's exports, having surpassed machinery and food products in the course of the decade.

Total chemical production in the country was worth $4.6 billion in 1988. Pharmaceuticals was the dominant sector at 30% of production, followed by plastics, including rubber products, at 18%, and organic chemicals at 15%. Fertilizers and pesticides as separate categories each accounted for less than 10% of total production, although as an overall "agrochemicals" category they would have rivaled plastics in production value.

Naray-Szabó gave a candid look at the prospects for the Hungarian chemical industry, which are clouded with problems. Among the problems facing the industry in its transformation into a modern, competitive one, is a serious need for capital investment, entrepreneurial management, and well-trained research and work forces. The well-trained researchers are already there, he maintains, but capital and management skills can only come from external investors.

The chemical industry contains many candidates for western investment through privatization, either acquisitions or joint ventures. As for management, he contends that "the majority of the top management in the chemical industry is unable or not willing to keep up with the fast switch from a centralized planning system to a market-oriented economy." Managers selected by officials of the ruling party in the past have conformed with communist traditions: loyalism, mediocrity, and in-

Potential polyolefins growth is large in Eastern Europe



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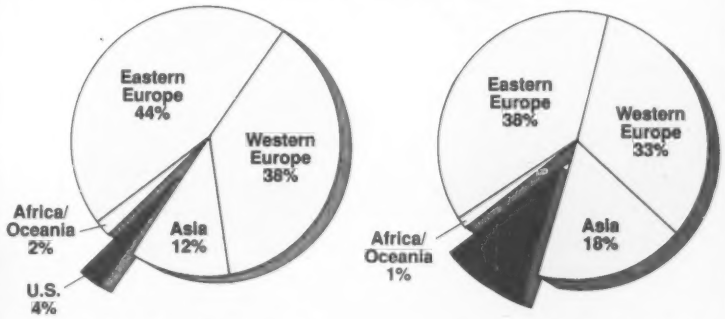
U.S. figures small in Soviet chemical trade



1989 U.S.S.R. imports of chemicals = $3.29 billion[a]

1989 U.S.S.R. exports of chemicals = $1.23 billion[a]

a Based on Soviet trade and investment transactions exchange rate, $1.00 = 1.8 rubles. **Source:** Niitekhim, U.S.S.R.

flexibility. The number of western-type entrepreneurial managers remains low, although, over time, training will help redress this lack.

However, the knowledge facing most people in the Hungarian chemical industry is that the industry is in dire need of new capital investment, particularly in environmental protection and cleanup.

Western companies can find good opportunities to invest in the industries in Eastern Europe, suggests Walter Kadl, president of Petrochemie Danubia, based in Schwechat, Austria, near Vienna. Eastern European markets are particularly attractive for chemical companies, says Kadl, because of the low per-capita consumption of chemical industry products. The implication: There is much room for growth within those countries.

Petrochemie Danubia's specialty is polyolefins, and Kadl presents some estimates for 1989 demand for these and other commodity thermoplastics in Europe. As a whole, the continent consumes some 25 million metric tons of commodity thermoplastics, including polyolefins, polyvinyl chloride, polystyrene, and styrene copolymers. Polyolefins are the largest single segment, with annual consumption of more than 14 million metric tons—58% of the total. Of the olefin polymers, low-density polyethylene is the most important, with 7 million metric tons, followed by polypropylene, 4 million metric tons, and high-density polyethylene, just under 3.5 million metric tons. By comparison, annual consumption of polyvinyl chloride is about 6.5 million metric tons, and of polystyrene 3 million metric tons.

"When we compare the consumption figures for Eastern and Western Europe with the respective population figures, we can see the huge potential existing in Eastern Europe," Kadl says. "The picture is certainly distorted somewhat by the inclusion of the U.S.S.R, but even without the U.S.S.R., the basics remain the same."

In contrast to the developing Hungarian investment scene, the Soviet Union still offers only limited opportunities. That was the gist of presentations by Viatcheslav M. Sokolsky and Valentina A. Gavrilenko, of Niitekhim, the Moscow-based Research Institute for Economic Studies & Information in Chemical Industry.

According to Sokolsky, Soviet chemical production in 1989 was worth about $27.8 billion (based on Soviet trade and investment transactions exchange rate, $1.00 = 1.8 rubles) with production by more than 1000 enterprises. Some 53% of output was accounted for by enterprises under the jurisdiction of the recently reorganized Ministry for Chemical & Petrochemical Industry.

R&D in Soviet chemicals is carried out by more than 100 R&D organizations, and a number of academic and educational institutions. However, emerging new processes and prod-

ucts have a hard time being put into effect. To introduce an innovation into production in the Soviet chemical industry takes as much as 15 to 20 years, according to Niitekhim estimates; the lifetime of technological processes has been shrinking, from 15 years in the early 1970s, to a predicted seven to eight years in the coming decade.

The U.S.S.R. is one of the leading producers of chemicals in the world, with a heavy emphasis on large-tonnage products, such as ammonia, methanol, benzene, and fertilizers. Basic chemicals in 1989 made up 36% of total production; polymers, 28%; and agrochemicals, 13%.

However, although a leading chemicals producer, it lags behind all large and even many small advanced countries in exporting. Chemicals in 1988 made up only about 4% of total Soviet exports, while they were 5.1% of imports, thereby ringing up a trade deficit in chemicals that has more than doubled during the 1980s.

Medical and pharmaceutical goods, and plastics and synthetic resins accounted for nearly half the imports. On the other hand, fertilizers made up nearly 40% of Soviet chemical exports, followed by inorganic chemicals at 19%. As Gavrilenko points out, in the 1980s the U.S.S.R. has taken a world lead in ammonia supply and in several other areas: Its share in the world trade of technical carbon amounts to about 20%, methanol 17%, and synthetic rubber 10%.

Chemical trade with the U.S. and Canada has grown little, she says, and almost not at all over the decade with Japan. It has picked up significantly, however, with developing countries. For example, by the end of the 1980s, India has become a major supplier of chemical products to the Soviets, with trade exceeding the 1980 level by nearly five times.

Niitekhim predicts that, given the Soviet Union's huge natural resource base, it will continue to be a major supplier to the world market of large-tonnage, energy-intensive chemicals such as methanol, ammonia, urea, and acetic acid, and of polymers such as polyethylene, polypropylene, and polyvinyl chloride.

Patricia Layman

France promotes south coast chemical region

Though ethylene profit margins are being squeezed worldwide, the Port of Marseilles Authority in southern France is seeking a company to construct a new cracking unit in the region to promote further development of a massive chemical complex.

Jean Rousset, president of the authority, told a press conference near Marseilles that two crackers, one operated by Naphtachimie, a joint venture of Atochem and BP, and one by Shell together produce more than 1 billion metric tons of ethylene annually. Although this represents some 36% of French ethylene production, it is already committed. Much of this ethylene as well as some 695 million metric tons of propylene is used locally to produce polyethylene and polypropylene. However, says Rousset, to develop the area further, "a third cracking plant is now necessary." About 70% of the more than 18,000 acres of land that the Port Authority owns at Fos is available for long-term lease.

The authority is a French government agency that operates three industrial zones and their associated ports—Berre, Lavera, and Fos—as well as the general cargo and passenger port of Marseilles on the Mediterranean coast of France. Among the advantages of the industrial zones, it says, are inexpensive energy, plentiful water, and new port installations in a region that is strategically located for both the import of feedstock and the export of petrochemicals. Operators in the area confirm the region's advantages and complain only of occasional power outages, particularly in the summer. Power officials plan to upgrade electrical reliability.

Petrochemical capital investments in the industrial zones topped $1 billion between 1985 and 1988.

Marc Reisch

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